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(54) **Franking machine**

Frankiermaschine

Machine d'affranchissement

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## Description

This invention relates to franking machines and in particular to machines for printing an impression indicating a charge in respect of carriage of an item by a carrier service such as a postal authority.

Franking machines are known which include a printing device for printing a franking impression on a mail item and in which operation of the printing device is controlled by means which maintain an account record of the usage of the machine. Often, franking machines operate in a prepayment mode in which the user makes a payment to the postal authority and the authority then enters the amount of the payment as a credit in the machine available for use in franking. The accounting means in the franking machine registers this credit amount and each time the machine is used to frank an item the credit amount is decremented by the value of postage used in the franking. In machines currently available, the accounting means comprises an electronic microprocessor operating under program routines to carry out the required accounting and control functions and electronic memory devices for storing accounting data. In addition to a descending register for storing the value of credit currently available for franking, the accounting means includes an ascending register for storing the accumulated value of postage charge used by the machine, a register to store a count of the number of items franked and a register to store the number of items franked with a value in excess of a predetermined value.

Heretofore, postal authorities have handled letters and parcels as a single combined activity and franking machines have been used to frank both letters and parcels to be carried by the postal authority. When dealing with an item which is too large to be handled by the franking machine, the franking impression is printed on a label is subsequently adhered to the item. However it is becoming common for postal authorities to separate their letters and parcels activities and to require revenue to be allocated to the appropriate activity.

According to the present invention a franking machine including a secure module; electronic control and accounting means within the secure module; a plurality of registers within the secure module for storing accounting data relating to use of the machine in franking items; means to input franking data to said electronic accounting and control means to select a value of franking; printing means operable by the electronic control and accounting means to print a franking impression on an item to be franked; said electronic control and accounting means being operative in response to input of said franking data to control the printing means to print a franking impression corresponding to the selected value of franking and to update the accounting data stored in the set of registers is characterised in that the plurality of registers within the secure module includes a first set of registers for storing accounting data relating to use

of the franking machine in respect of a first service and a second set of registers for storing accounting data relating to use of the franking machine in respect of a second service; in that the input means is operable to select one said first and second services; in that the electronic accounting and control means is operative in response to selection of said one of the services by the input means to control the printing means to print a first franking impression and to update the accounting data in the first set of registers in response to selection of said first service and to print a second franking impression and to update the accounting data in the second set of registers in response to selection of said second service.

Embodiments of the invention will now be described by way of example with reference to the drawings in which:-

Figure 1 is a block circuit diagram of a franking machine,

Figure 2 is an example of a report containing register values and validation codes, and

Figure 3(a), 3(b) and 3(c) is an example of another format of report.

Referring first to Figure 1, a franking machine includes a postage meter housed in a secure module 10 and a printing device 11 for printing a franking impression and, if desired, a slogan or other advertising material. The postage meter housed in the secure module 10 comprises an electronic microprocessor 12 which is operable under program routines stored in a read only memory (ROM) 13 to carry out accounting and control operations. Memories 14 and 15 have storage locations providing registers for storing accounting data. If the meter is to be used in a pre-payment system in which payment is made to a postal authority or other carrier prior to use of the machine for franking items, the registers include a descending register for registering a value of credit corresponding to payments made and which is available for use in franking operations. The memories also provide a plurality of sets of registers, each set of registers being assigned to register accounting data relating to different services respectively. Such services may comprise letters and parcels and may also comprise different classes of service such as first and second class mail in respect of letters. For each service which may be selected, the memories are arranged to provide an ascending register for registering a tote value consisting of an accumulated value used in franking items and an items register for registering the number of items franked by the machine. A high items register for registering the number of items franked with a value in excess of a predetermined value may be provided for one or more of the services which may be selected. In order to maintain integrity of the accounting data in the event of a fault occurring, each of the registers is replicated in the memories 14 and 15 such that each memory provides the registers in duplicate. When a single pre-

payment may be made in respect of franking for different services, it is necessary to provide only a single descending register for registering credit which is available for use for all the services which may be selected. However when it is required that payments are made to different authorities or that separate payments are made to the same authority in respect of different services, a descending register is provided for each service to which separate payments are required to be made. The memories 14, 15 are non-volatile so that accounting data stored therein is retained even when the power to the franking machine fails or is switched off. The memories may be electronic memory devices which require power to retain data and which are powered by long life batteries 16, 17. A random access memory (RAM) 30 is provided as working store for the microprocessor 12. The read only memory 13 in addition to storing program routines for controlling operation of the microprocessor 12 also stores print format data relating to a plurality of franking impressions required for the respective different services which may be selected.

In addition to the registers provided in respect of each service which can be selected, a further set of registers may be provided to store credit, tote, items count and high items count in respect of the overall operation of the franking machine. Accordingly this further set of registers, referred to hereinafter as primary registers, stores accounting data which is the totals of the registers provided for the different services. These registers provided for the different services will be referred to hereinafter as secondary registers.

The printing device 11 is shown in Figure 1 as being external to the secure module and is connected to the microprocessor through circuits 18 operative to check that the printing device is connected and that print data signals output from the microprocessor are received by the printing device without corruption.

The microprocessor 12 receives input control and data signals via an input/output interface 19 which includes protection circuits to protect the circuits in the secure module from accidental or wilful damage due to excess voltages which may be applied to external connections 20 to the module.

In the embodiment shown in Figure 1, the postage meter is operated and controlled from a personal computer or workstation 21. The computer is connected to the franking machine by ports 22 connected to an input/output interface 23. The interface 23 is connected to a microprocessor 24 which communicates via the connections 20 with the microprocessor 12 of the postage meter. The microprocessor 24 is operable under the control of program routines stored in a read only memory (ROM) 26 and a random access memory (RAM) 25 is provided as a working store for the microprocessor 24. A second printing device 27 for printing destination data on mail items is connected to and operated by the microprocessor 24. Sensors 28 and motors 29 for the feeding and sensing of mail items and, when used, ink

ribbons for the printing devices 11, 27 are connected to the microprocessor 24 via the input/output interface 23. The sensors 28 provide signals to the microprocessor 24 in respect of the feeding of mail items and ink ribbons and the microprocessor 24 outputs signals to control energisation of the drive motors 29 for the mail item feed and ink ribbon feeds. The computer 21 includes a keyboard for the input by an operator of operational commands to control the franking machine and to input destination data, service required and the value of franking required for mail items. The computer 21 also includes a display screen to echo the data input on the keyboard and to display prompts to assist the operator in controlling operation of the franking machine.

When an operator inputs a command requiring franking of an item, the operator is prompted to input the destination address, the service and the value of franking required. The destination address data is received by the microprocessor 24 and is output as a serial print data stream to the second printing device 27. The service data and value of franking are received by the microprocessor 24 and output via the interface 19 to the microprocessor 12. The microprocessor 12 carries out checks to ensure that the credit available for the service selected is sufficient for the selected value of franking. If there is sufficient credit available, the microprocessor continues in its franking routine. The microprocessor 12 updates the values stored in the registers assigned to the specific service which has been selected by the operator to take account of the franking to be effected. The microprocessor then continues in a franking printing routine by selecting, from the read only memory 13, a print data format corresponding to the service selected, combining the print data format with print data relating to the selected franking value and outputting print data signals to the printing device 11 to effect printing of a franking impression appropriate to the service selected including the value of franking. The format of the franking impression may be of generally the same form for more than one service and includes a part which is specific to the selected service. For example the impression may include "FIRST" or "SECOND" to indicate different classes of letter post or may include "PARCELS" to indicate that the franking relates to franking of a parcel to be handled by a parcels delivery service as distinct from a letter delivery service. Alternatively the format of the franking impressions for different services may be distinctly different from one another.

The printing device 27 is a digital printer which is controlled by digital print signals to print destination addresses on the items to be mailed. Likewise it is preferred to use a digital printer for the printing device 11. The two printing devices may be positioned adjacent to one another whereby a mail item can be fed past both printing devices simultaneously and the destination address and the franking impression are printed in a single pass of the mail item. Alternatively the printing device 27 may be housed separately and the mail item may be

fed first past the device 27 to print the destination address and then past the printing device 11 to print the franking impression. Instead of using a digital printer, the printing device 11 may be a mechanical printing device in which one or more printing elements are movable selectively into and out of operative printing positions to enable printing of a franking impression corresponding to a selected service.

The printing device 27 in addition to, or instead of, printing destination addresses may be utilised to print reports providing information relating to account data stored in the memories 14, 15. In response to a command input from the computer 21, the microprocessor 12 operates under a program routine to read the account values stored in the credit, tote, items count and high items count registers and to output these values to the microprocessor 24 to enable the microprocessor 24 to control the printing device 27 to print reports containing these values. In addition to reading the register values and outputting them to the microprocessor 24, the microprocessor 12 also generates in respect of each register value a validation code which is output to the microprocessor 24 for printing by the printing device 27 on the report. The validation codes may be generated by using an encryption key to encrypt the register values. When the microprocessor 12 reads out the register values from the memories 14, 15 it carries out a validation check to ensure that the value in the replications of each register correspond and hence that the integrity of the data has not been destroyed due to a fault or unauthorised tampering with the secure module. If desired the register values from both memory devices 14 and 15 may be printed out as shown in Figure 2 to permit determination of the integrity of the data by the recipient of the report.

The provision of the validation code in the reports enables the recipient of the report, for example the postal authority, to check and validate the authenticity of the register values printed in plain in the reports. If desired, the register values and/or the validation codes may be printed in machine readable form such as a bar code to enable the data contained in the reports to be input automatically to a postal authority computer and checked and validated by the computer.

When the printing device 27 comprises a printer separate from the franking machine, for example a printer of the type used as a peripheral device to a computer, a report of the format shown in Figure 2 may be printed. However when the printing device 27 is mounted in the franking machine adjacent to the printing device 11 and the printing device 27 has a capacity only sufficient for printing a relatively small number of lines such as in a destination address, the report may be printed on one or more label strips as shown for example in Figures 3 (a), 3(b) and 3(c).

## Claims

1. A franking machine including a secure module; electronic control and accounting means (12) within the secure module; a plurality of registers (14, 15) within the secure module for storing accounting data relating to use of the machine in franking items; means (21) to input franking data to said electronic accounting and control means to select a value of franking; printing means (11) operable by the electronic control and accounting means (12) to print a franking impression on an item to be franked; said electronic control and accounting means being operative in response to input of said franking data to control the printing means to print a franking impression corresponding to the selected value of franking and to update the accounting data stored in the set of registers (14, 15) characterised in that the plurality of registers (14, 15) within the secure module includes a first set of registers (14, 15) for storing accounting data relating to use of the franking machine in respect of a first service and a second set of registers (14, 15) for storing accounting data relating to use of the franking machine in respect of a second service; in that the input means (21) is operable to select one said first and second services; in that the electronic accounting and control means (12) is operative in response to selection of said one of the services by the input means to control the printing means (11) to print a first franking impression and to update the accounting data in the first set of registers (14, 15) in response to selection of said first service and to print a second franking impression and to update the accounting data in the second set of registers in response to selection of said second service.
2. A franking machine as claimed in claim 1 further characterised by the provision of a further set of registers (14, 15) for storing totals of accounting data values stored in the first and second of sets of registers (14, 15).
3. A franking machine as claimed in claim 1 or 2 further characterised in that the printing means (11) comprises a digital printer responsive to print data signals which define the franking impression to be printed.
4. A franking machine as claimed in claim 1 or 2 further characterised in that the printing means (11) comprises a mechanical printer including one or more elements selectively movable into a printing position to print a franking impression corresponding to the selected service.
5. A franking machine as claimed in any preceding claim further characterised in that the electronic

control and accounting means (12) is operable to read account data stored in the registers (14, 15), to generate a validation code for the account data read from each register and to output said account data and validation code to the printing means (27) to print a report containing said account data and validation code.

6. A franking machine as claimed in any preceding claim further characterised in that the first set of registers includes a first descending register for storing a first value available for use in franking items in respect of the first service; and a first tote register for storing a first accumulated value of postage charge used in franking items in respect of the first service and in that the second set of registers includes a second descending register for storing a second value available for use in franking items in respect of the second service; and a second tote register for storing a second accumulated value of postage charge used in franking items in respect of the second service.
7. A franking machine as claimed in any one of claims 1 to 5 further characterised in that the registers include a descending register for storing a value available for use in franking items in respect of the first and second services; and in that the first set of registers includes a first tote register for storing a first accumulated value of postage charge used in franking items in respect of the first service and in that the second set of registers includes a second tote register for storing a second accumulated value of postage charge used in franking items in respect of the second service.

#### Patentansprüche

1. Frankiermaschine, enthaltend ein gesichertes Modul, elektronische Steuer- und Buchhaltungsmittel (12) in dem gesicherten Modul, eine Mehrzahl von Registern (14, 15) in dem gesicherten Modul zum Speichern von Buchhaltungsdaten, die sich auf den Gebrauch der Maschine zum Frankieren von Gegenständen beziehen, Mittel (21) zum Eingeben von Frankierungsdaten in die elektronischen Steuer- und Buchhaltungsmittel zur Wahl eines Frankaturwertes und eine durch die elektronischen Steuer- und Buchhaltungsmittel (12) betätigbare Druckvorrichtung (11) zum Drucken eines Frankierungsaufdrucks auf einen zu frankierenden Gegenstand, wobei die elektronischen Steuer- und Buchhaltungsmittel durch die Eingabe der Frankierungsdaten betätigbar sind zum Steuern der Druckvorrichtung, so dass diese einen dem gewählten Frankaturwert entsprechenden Frankierungsaufdruck druckt, und zum Aktualisieren der in dem Satz von Registern (14, 15) gespeicherten Buchhaltungsdaten, dadurch gekennzeichnet, dass die Mehrzahl von Registern (14, 15) in dem gesicherten Modul einen ersten Satz von Registern (14, 15) zum Speichern von Buchhaltungsdaten, die sich auf den Gebrauch der Frankiermaschine im Hinblick auf einen ersten Dienst beziehen, und einen zweiten Satz von Registern (14, 15) zum Speichern von Buchhaltungsdaten, die sich auf den Gebrauch der Frankiermaschine im Hinblick auf einen zweiten Dienst beziehen, enthalten, dass die Eingabemittel (21) zum Wählen des ersten oder des zweiten Dienstes betätigbar sind, dass die elektronischen Steuer- und Buchhaltungsmittel (12) gesteuert durch die Wahl des ersten oder des zweiten Dienstes über die Eingabemittel betätigbar sind zum Steuern der Druckvorrichtung (11) derart, dass diese einen ersten Frankierungsaufdruck druckt, und zum Aktualisieren der Buchhaltungsdaten im ersten Satz von Registern (14, 15) bei Wahl des ersten Dienstes, und zum Steuern der Druckvorrichtung derart, dass diese einen zweiten Frankierungsaufdruck druckt, und zum Aktualisieren der Buchhaltungsdaten im zweiten Satz von Registern bei Wahl des zweiten Dienstes.
2. Frankiermaschine nach Anspruch 1, dadurch gekennzeichnet, dass ein weiterer Satz von Registern (14, 15) vorhanden ist zum Speichern von Gesamtwerten von Buchhaltungsdatenwerten, die im ersten und im zweiten Satz von Registern (14, 15) gespeichert sind.
3. Frankiermaschine nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass die Druckvorrichtung (11) einen digitalen Drucker enthält, der auf Druckdatensignale anspricht, welche den zu druckenden Frankierungsaufdruck definieren.
4. Frankiermaschine nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass die Druckvorrichtung (11) einen mechanischen Drucker mit einem oder mehreren Elementen enthält, die selektiv in eine Druckstellung bewegbar sind, um einen dem gewählten Dienst entsprechenden Frankierungsaufdruck zu drucken.
5. Frankiermaschine nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, dass die elektronischen Steuer- und Buchhaltungsmittel (12) betätigbar sind zum Lesen von in den Registern (14, 15) gespeicherten Buchhaltungsdaten, zum Erzeugen eines Validierungscodes für die aus jedem Register gelesenen Buchhaltungsdaten und zum Ausgeben der Buchhaltungsdaten und des Validierungscodes an die Druckvorrichtung (27) für den Druck eines Rapportes, der die Buchhaltungsdaten und den Validierungscodes enthält.

6. Frankiermaschine nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, dass der erste Satz von Registern ein erstes abwärtszählendes Register enthält zum Speichern eines ersten Wertes, der zur Verwendung beim Frankieren von Gegenständen im Hinblick auf den ersten Dienst zur Verfügung steht, und ein erstes Total-Register enthält zum Speichern eines ersten kumulierten Wertes von Postgebühren, die beim Frankieren von Gegenständen im Hinblick auf den ersten Dienst gebraucht worden sind, und dass der zweite Satz von Registern ein zweites abwärtszählendes Register enthält zum Speichern eines zweiten Wertes, der zur Verwendung beim Frankieren von Gegenständen im Hinblick auf den zweiten Dienst zur Verfügung steht, und ein zweites Total-Register enthält zum Speichern eines zweiten kumulierten Wertes von Postgebühren, die beim Frankieren von Gegenständen im Hinblick auf den zweiten Dienst gebraucht worden sind.
7. Frankiermaschine nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, dass die Register ein abwärtszählendes Register enthalten zum Speichern eines Wertes, der zur Verwendung beim Frankieren von Gegenständen im Hinblick auf den ersten und den zweiten Dienst zur Verfügung steht, dass der erste Satz von Registern ein erstes Total-Register enthält zum Speichern eines ersten kumulierten Wertes von Postgebühren, die beim Frankieren von Gegenständen im Hinblick auf den ersten Dienst gebraucht worden sind, und dass der zweite Satz von Registern ein zweites Total-Register enthält zum Speichern eines zweiten kumulierten Wertes von Postgebühren, die beim Frankieren von Gegenständen im Hinblick auf den zweiten Dienst gebraucht worden sind.

#### Revendications

1. Machine d'affranchissement comprenant un module de sécurité ; des moyens de commande et de comptabilité électroniques (12) à l'intérieur du module de sécurité ; un certain nombre de registres (14, 15) à l'intérieur du module de sécurité pour stocker des données de comptabilité relatives à l'utilisation de la machine pour affranchir des articles de courrier ; des moyens (21) pour introduire des données d'affranchissement dans les moyens de comptabilité et de commande électroniques de manière à sélectionner une valeur d'affranchissement ; des moyens d'impression (11) commandables par les moyens de commande et de comptabilité électroniques (12) pour imprimer une impression d'affranchissement sur un article de courrier à affranchir ; les moyens de commande et de comptabilité électroniques pouvant fonctionner

en réponse à l'entrée des données d'affranchissement pour commander les moyens d'impression de façon qu'ils impriment une impression d'affranchissement correspondant à la valeur d'affranchissement sélectionnée, et pour mettre à jour les données de comptabilité stockées dans l'ensemble des registres (14, 15), caractérisée en ce que la pluralité des registres (14, 15) à l'intérieur du module de sécurité comprend un premier ensemble de registres (14, 15) pour stocker des données de comptabilité relatives à l'utilisation de la machine d'affranchissement concernant un premier service, et un second ensemble de registres (14, 15) pour stocker des données de comptabilité relatives à l'utilisation de la machine d'affranchissement concernant un second service ; en ce que les moyens d'entrée (21) sont commandables pour sélectionner l'un ou l'autre des premier et second services ; en ce que les moyens de comptabilité et de commande électroniques (12) peuvent fonctionner en réponse à la sélection de l'un des services par les moyens d'entrée, pour commander les moyens d'impression (11) de façon qu'ils impriment une première impression d'affranchissement, pour mettre à jour les données de comptabilité dans le premier ensemble de registres (14, 15) en réponse à la sélection du premier service, pour imprimer une seconde impression d'affranchissement, et pour mettre à jour les données de comptabilité dans le second ensemble de registres en réponse à la sélection du second service.

2. Machine d'affranchissement selon la revendication 1, caractérisée en outre par l'utilisation d'un autre ensemble de registres (14, 15) pour stocker des totaux de valeurs de données de comptabilité stockées dans le premier et le second ensembles de registres (14, 15).
3. Machine d'affranchissement selon la revendication 1 ou 2, caractérisée en outre en ce que les moyens d'impression (11) comprennent une imprimante numérique répondant à des signaux de données d'impression qui définissent l'impression d'affranchissement à imprimer.
4. Machine d'affranchissement selon la revendication 1 ou 2, caractérisée en outre en ce que les moyens d'impression (11) comprennent une imprimante mécanique comprenant un ou plusieurs éléments pouvant se déplacer sélectivement pour venir dans une position d'impression de manière à imprimer une impression d'affranchissement correspondant au service sélectionné.

5. Machine d'affranchissement selon l'une quelconque des revendications précédentes, caractérisée en outre en ce que les moyens de commande et de comptabilité électroniques (12) sont commandables pour lire des données de compte stockées dans les registres (14, 15), pour générer un code de validation des données de compte lues à partir de chaque registre, et pour fournir en sortie ces données de compte et le code de validation aux moyens d'impression (27) de façon qu'ils impriment un compte-rendu contenant les données de compte et le code de validation.
6. Machine d'affranchissement selon l'une quelconque des revendications précédentes, caractérisée en outre en ce que le premier ensemble de registres comprend un premier registre descendant pour stocker une première valeur disponible pour être utilisée dans l'affranchissement d'articles de courrier en ce qui concerne le premier service, et un premier registre totalisateur pour stocker une première valeur cumulée des frais postaux utilisés dans l'affranchissement des articles de courrier en ce qui concerne le premier service ; et en ce que le second ensemble de registres comprend un second registre descendant pour stocker une seconde valeur disponible pour être utilisée dans l'affranchissement d'articles de courrier en ce qui concerne le second service, et un second registre totalisateur pour stocker une seconde valeur cumulée de frais postaux utilisés dans l'affranchissement d'articles de courrier en ce qui concerne le second service.
7. Machine d'affranchissement selon l'une quelconque des revendications 1 à 5, caractérisée en outre en ce que les registres comprennent un registre descendant pour stocker une valeur disponible pour être utilisée dans l'affranchissement d'articles de courrier en ce qui concerne les premier et second services, en ce que le premier ensemble de registres comprend un premier registre totalisateur pour stocker une première valeur cumulée des frais postaux utilisés dans l'affranchissement d'articles de courrier en ce qui concerne le premier service ; et en ce que le second ensemble de registres comprend un second registre totalisateur pour stocker une seconde valeur cumulée des frais postaux utilisés dans l'affranchissement d'articles de courrier en ce qui concerne le second service.

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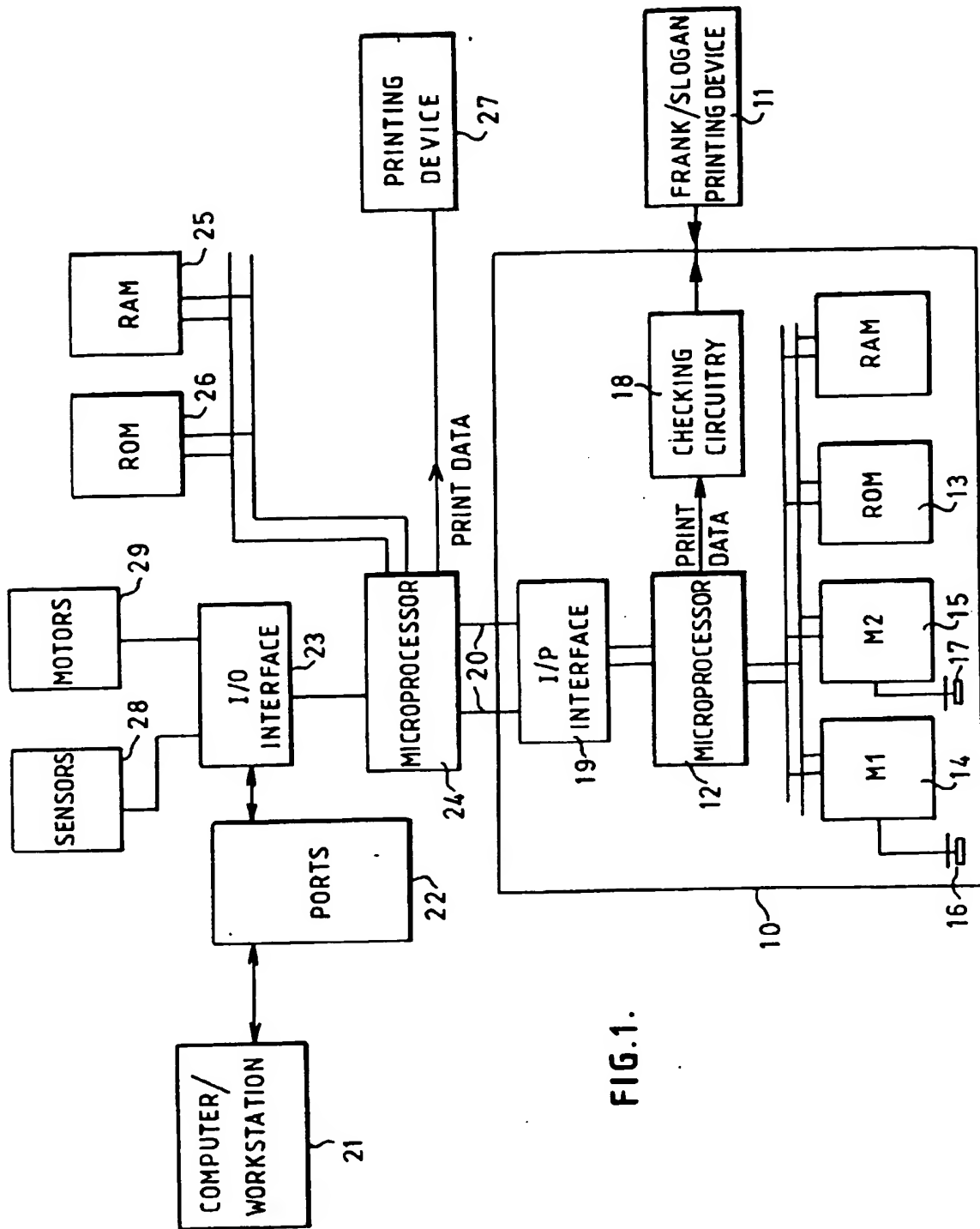


FIG.1.



| OPERATOR IDENTITY - VALIDATION CODE |                   | LICENCE NO.     |  |
|-------------------------------------|-------------------|-----------------|--|
| METER DATE                          | - VALIDATION CODE |                 |  |
| METER TIME                          | - VALIDATION CODE |                 |  |
| STATUS FLAGS                        |                   | VALIDATION CODE |  |
| SERVICE CODE                        |                   | VARIANT CODE    |  |
| RECOMMENDED REPAIRS                 |                   | SERVICE CODE    |  |
| <u>PRIMARY</u>                      |                   |                 |  |
| <u>REGISTERS</u>                    |                   |                 |  |
| CREDIT                              |                   |                 |  |
| VALIDATION CODE                     |                   |                 |  |
| TOTE                                |                   |                 |  |
| VALIDATION CODE                     |                   |                 |  |
| TOTE + CREDIT                       |                   |                 |  |
| BATCH TOTE                          |                   |                 |  |
| ITEMS                               |                   |                 |  |
| VALIDATION CODE                     |                   |                 |  |
| HIGH ITEMS                          |                   |                 |  |
| BATCH ITEMS                         |                   |                 |  |
| CHECKSUM                            |                   |                 |  |
| CREDIT                              |                   |                 |  |
| VALIDATION CODE                     |                   |                 |  |
| TOTE                                |                   |                 |  |
| VALIDATION CODE                     |                   |                 |  |

FIG.2. MEMORY 1 MEMORY 2

|                 |                     |  |
|-----------------|---------------------|--|
| OPERATOR I/D    | LICENCE NUMBER      |  |
| VALIDATION CODE | VALIDATION CODE     |  |
| METER DATE      | VARIANT CODE        |  |
| VALIDATION CODE | SERVICE CODE        |  |
| METER TIME      | RECOMMENDED REPAIRS |  |
| STATUS FLAGS    |                     |  |

FIG.3(a).

|                              |                             |                 |  |
|------------------------------|-----------------------------|-----------------|--|
| <u>PRIMARY<br/>REGISTERS</u> | CREDIT                      | ITEMS           |  |
|                              | VALIDATION CODE             | VALIDATION CODE |  |
|                              | TOTE                        | HIGH ITEMS      |  |
|                              | VALIDATION CODE             | BATCH ITEMS     |  |
|                              | TOTE + CREDIT<br>BATCH TOTE | CHECKSUM        |  |

FIG.3(b).

|                                |                         |  |
|--------------------------------|-------------------------|--|
| <u>SECONDARY<br/>REGISTERS</u> | CREDIT                  |  |
|                                | VALIDATION CODE         |  |
|                                | TOTE<br>VALIDATION CODE |  |

FIG.3(c).